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FINAL REPORT

PRUNING TRIALS ON SASKATOON BERRY (AMELANCHIER ALNIFOLIA)

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Pruning Trials on Saskatoon Berry (*Amelanchier alnifolia*)

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A. Abstract/Summary

We were able to satisfactorily control the height (6 foot – 2 m) of Thiessen, Smoky, Martin and Northline Saskatoon bushes by performing a 20 percent removal to the ground cut and tipping back procedure. Bush character and plant health were good. Yields were equal to or above controls. Cuts with diameters under ½ inch (1.25 cm) remain healthy. Larger cuts are likely to develop canker. Cuts to the ground allow regrowth to be healthy. It is recommended to grow lower growing cultivars and start pruning early enough to keep plants dwarfed rather than leaving large diameter cuts.

B. Executive Summary

The Project

In 1995 I reported that it was impossible to maintain a 6 to 7 foot Saskatoon berry bush by removal cuts to the ground alone (1995 ADF Report). This work was carried out on tall robust Thiessen seedlings which were about 12 feet high and getting taller. When we attempted to shorten these bushes back with hedge cuts they developed severe canker on wood over ½ inch in diameter. Pruning of these plants should have started at the 4-5 foot height and tipping back put into practice. I am not sure that these tall plants could ever be kept down to 6 feet. We started this pruning project at Ben Epp's Strawberry ranch and later worked at Cliff Shockey's Saskatoon berry plantation. We encountered moderate to severe leaf spot 4 years and bud worm/leaf rollers in 1 year. Each of these was severe enough to lower yields or destroy the crop. Although these were very conscientious growers they were both reluctant to use any more sprays than they had to and as a result the disease and insects were a problem. More choices for growers must be available to control insects and disease.

The new work was carried out on Northline and Smoky, two low growing cultivars and on Martin and Thiessen from medium to tall growing cultivars. We pruned these plants by removing 20% of the oldest wood to the ground and tipped the wood at the top of the plant back to 6 feet (2 m). The plants grew normally with no canker and yielded as well or higher than control non-pruned plants. Plants pruned to the 3 foot (1 m) level showed canker, became unhealthy and were going to die in the next few years. Plants cut to the ground produced healthy new growth but were not going to fruit for 2-3 years.

Leaf spot was a severe disease in both plantations. Plant pruning procedures did not appear to have any bearing on the severity of the leaf spot.

Yield, in relation to the time of year pruning was performed, showed that spring pruning was equal or superior to summer or fall pruning. All three (spring, summer, fall) pruning times were equal or better yielding than control unpruned plants.

Recommendations

1. Choose low growing cultivars.
2. Begin pruning early to keep plants under control and somewhat dwarfed.
3. Clean up canker in the plantation by cutting it out to the ground and removing the damaged material and burn.
4. Remove dead and canker ridden plants from the wild and also burn.
5. Do not make large aboveground cuts as they may encourage canker. If you must make large cuts, use a wound dressing.
6. Spring cuts and tipping back look like the best time of the year to prune Saskatoon berry bushes because:
    a) they are easy to see where to make cuts,
    b) they heal over quickly, and there is less weight to remove from the field.
7. Saskatoon bushes remain hardy when pruned in the spring, summer or fall seasons.
8. When removing wood to the ground be sure not to damage adjacent wood which is to remain for production as this can encourage or allow canker to enter the plants.

C. Technical Report

Background:

Saskatoon berry plants until recently were not grown domestically and as a result we have little information on desirable pruning practices. Traditional bush fruit pruning theory is one of maintaining a healthy correct height and productive plant. In Saskatoon bush pruning we require a plant that is about six feet in height, narrow in the row at ground level, somewhat open branched and fruitful. Other bush fruits usually are pruned to remove to the ground 20% of the oldest stems, thus allowing new growth to replace the old stems. This practice is carried out each spring when the plants are still dormant, and by the time five years have elapsed all wood has been renewed. This practice is generally considered the best way to maintain health and productivity. Because this practice works with other bush fruit it was the first pruning procedure to be looked at on Saskatoon berry bushes. This practice is usually referred to as renewal or removal pruning.

In 1995 I reported (ADF D-91-CT0856) that Thiessen seedlings which had developed to a height of 8-12 feet (4 m) were not possible to keep at an acceptable height of 6-7 feet (2 m) by removal pruning alone. At that time we removed about 20% per year of the oldest growth to the ground, and the remaining wood each time continued to grow and the canopy quickly replaced the removed portions. These Thiessen seedlings were extremely robust, much more robust than the original Thiessen and Martin a selected Thiessen seedling. This early work demonstrates the necessity of removing some portion of the top growth of the fruiting wood to maintain a picking height of 6 to 7 feet (2 m).

Realizing the plants are getting too tall and the top height must be controlled, we embarked on three experiments: #1 removal of top growth down to the 6 feet (2 m) height; #2 removal of top growth down to the 3 foot (1 m) height and #3 a complete removal of the top growth to the ground.

We also looked at renewal (removal) pruning of immature Saskatoon plants, which had been selected out of the better quality Thiessen seedlings. In this work we started with plants which were much smaller, 3 to 4 feet (1.3 m). These plants did grow quickly and by the time our report had to be completed we could see that the selected seedlings also needed to have some top growth removed to maintain an easy picking height.

Conclusions from the early work (1995 report) were as follows:

1. Pruning cuts to ground level do not encourage canker when pruning Saskatoon berry bushes (no infections observed).

2. Above ground cuts, particularly in larger diameter wood, showed canker entry at most of the sites of a cut.

3. Smaller above ground wood cuts (under ¼ inch) showed little or no canker entry. Should cuts be necessary to control height by removing top growth wood taken off should not be over ¼ inch.

4. Tall mature plants cannot have their height effectively reduced by renewal pruning only and height reduction of large diameter top growth will encourage canker.

5. Young plants may be height controlled with renewal pruning, however, this procedure on these bushes requires several more years of observations to conclusively make a statement. Note: young trees that have never developed a large top also do not have large root development and are therefore easier to keep down as there is less push to develop a large replacement top when pruning.

Project Objectives

Our main objectives were to carry on previous pruning techniques and evaluate these procedures on clonal plant materials. At the time of the 1995 trials there was no clonal stock available for trial, and the more recent plantings are largely clonal and of lower growing types. Evaluation of these newer planted stocks were to include:

(a) height and width control
(b) yields associated with different pruning techniques
(c) disease and insect problems associated with pruning techniques.

Grower Objectives/Needs

The growers in Saskatchewan have planted their Saskatoon bushes often in rows ~15 feet apart (4.5 m) and 4 feet (1.3 m) between plants. These plants are planted to accommodate their equipment and although some are planning on using mechanical harvesting equipment most are looking at the 'U' pick market. What the growers need are some answers to these questions.

(1) When should I start pruning?
(2) How should the plants be pruned?
(3) How can I get the best yield and quality?
(4) How can I control disease?

Some of these questions can be answered from the observations of this project.

Observations

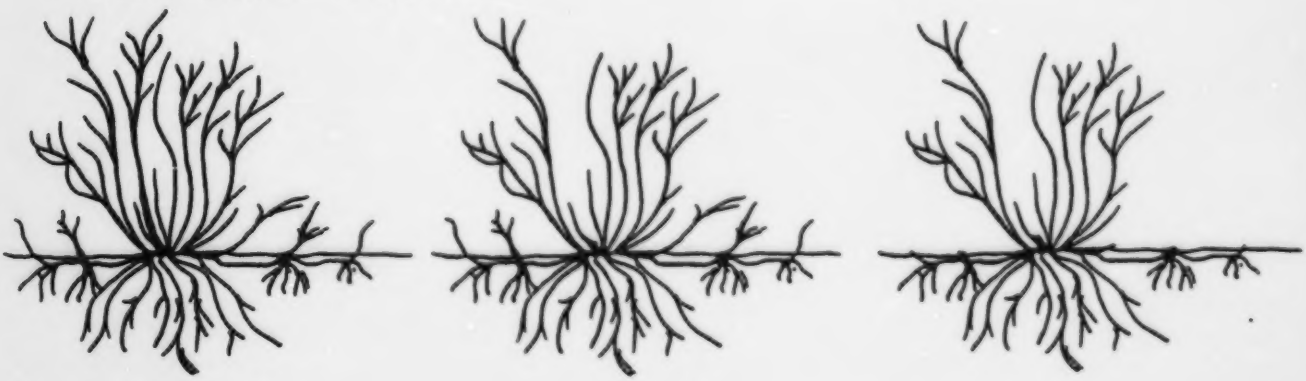
Ben Epp's Strawberry Ranch

The project was started in 1996 with three cultivars (Northline, Smoky and Thiessen) located at Ben Epp's Strawberry Ranch. I chose this location because it was close to Saskatoon and had a variety of cultivars that were still small enough to hopefully keep at a pickable height. The Saskatoon plantation was on a sandy soil irrigated by solid set sprinklers. Because the work was close I decided to harvest eight replicates instead of the usual four which should give us very accurate evaluations. Each replicate contained eight plants and were picked on a per plant basis as plants at this stage were quite identifiable in the row.

Ben Epp's Strawberry Ranch, however, did not turn out to be a great place to do research work. It was impossible to get realistic yield data on the Thiessen cultivar due to grazing by the 'U' pickers. People were so hungry to harvest that they were picking Thiessen when it was just beginning to ripen. They also chose to ignore our signs and ribbons. Therefore no data was available on yield of this cultivar.

Pruning Procedures

A. RENEWAL (REMOVAL) PRUNING



Procedures

1. Control – all plants unpruned.

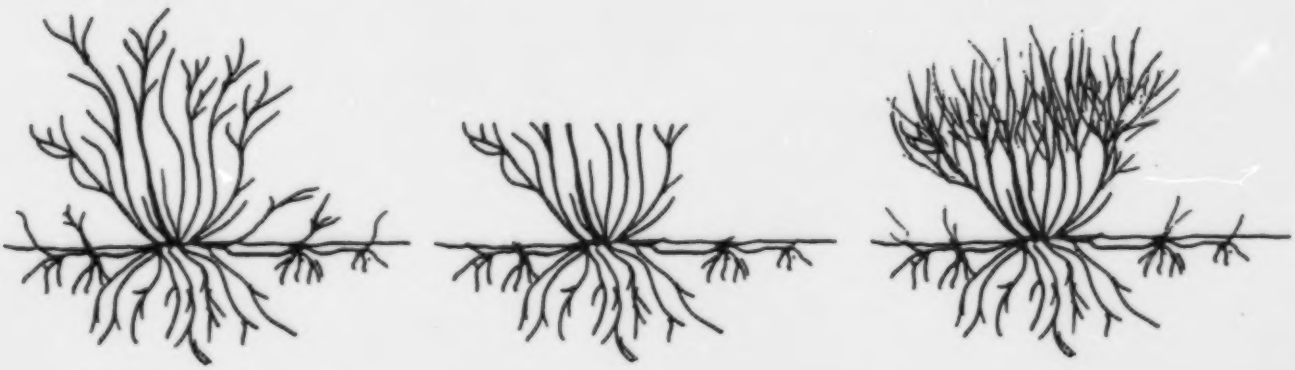
2. 20% Spring Cut – Plants in this group were pruned removing approximately 20% of their growth by a removal cut (at ground level) when fruit was harvested approximately August 1

(each year). Plant portions remaining were tipped back to a bud at approximately 6 feet (2 m) in height.

3. 20% Summer Cut – Plants in this group were pruned removing approximately 20% of their growth by a removal cut (at ground level) when the plants are dormant in the spring just prior to growth activity (each year). Plant portions remaining were tipped back to a bud at approximately 6 feet (2 m) in height.

4. 20% Fall Cut - Plants in this group were pruned removing approximately 20% of their growth by a removal cut (at ground level) when the plants are dormant in the spring just prior to growth activity (each year). Plant portions remaining were tipped back to a bud at approximately 6 feet (2 m) in height.

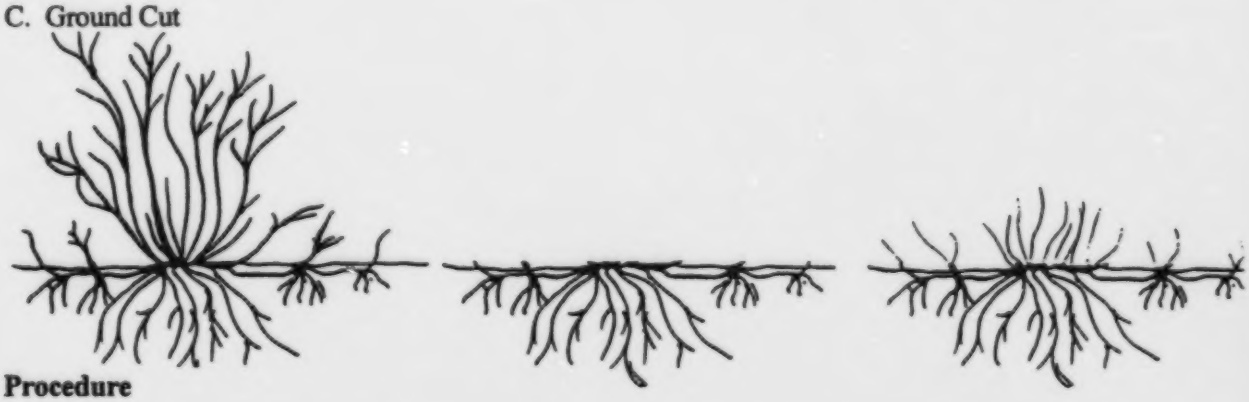
B. Hedge Cut



Procedure

Hedge cuts – We removed the top growth down to 3, 4, 5, and 6 feet in the Thiessen, Smoky and Northline cultivars. All cultivars were examined for production and disease susceptibility.

C. Ground Cut



Procedure

C. Ground cuts – Observing response after being cut completely to the ground with removal cuts. Note: All pruning materials were removed from the field and burned.

Data

Data for the two years of harvestable plants at the Ben Epp Ranch are recorded in **Table 1**. They show that the pruning in the first year (spring) had some effect on reducing the yield on Smoky and Northline cultivars. This reduction, however, was not significant in 1996, the first year of pruning. The summer and fall replications had not yet been pruned at the time of harvest. In 1997, the first year of harvest with all three treatments and the control the yields of the spring pruned plants showed enough yield over all other treatments and the control to be considered significant. In both years of harvesting at Ben Epp's ranch we had problems with control of the public pickers and severe leaf spot infections on all cultivars. The leaf spot did, however, spare Northline enough to get good accurate yields for the two years.

Because we previously had problems with stray pickers and leaf spot we decided to go a preharvest evaluation of fruit set. I am including these observations because the actual Northline yields match the observations very closely (Table 1).

Fruit set approximately 1 week prior to harvesting. This is a subjective rating to have some idea of fruit production should it be impossible to defend the test plants from stray "U Pick people", drought, disease, etc.

Northline Rating: High 9-6; Medium 6-3; Low 3-0

Rep	Control	Spring Pruning	Summer Pruning	Fall Pruning
1	2	8	4	2
2	3	8	4	3
3	8	5	2	2
4	3	4	3	3
5	4	6	4	4
6	3	8	2	8
7	2	5	3	3
8	7	6	1	1
Average Rating on 8 reps	4	6.2	2.9	3.3

Smoky Rating: High 9-6; Medium 6-3; Low 3-0

Rep	Control	Spring Pruning	Summer Pruning	Fall Pruning
1	4	5	6	5
2	6	7	4	4
3	6	7	3	4
4	4	4	4	5
5	4	5	4	4
6	4	6	5	5
7	6	4	4	4
8	4	6	5	5
Average Rating on 8 reps	4.8	5.5	4.4	4.5

Thiessen Rating: High 9-6; Medium 6-3; Low 3-0

Rep	Control	Spring Pruning	Summer Pruning	Fall Pruning
1	4	3	8	8
2	3	5	7	7
3	5	6	3	6
4	8	7	7	3
5	5	6	8	8
6	7	3	6	6
7	5	4	5	3
8	8	8	3	7
Average Rating on 8 reps	5.6	5.3	5.8	6

Harvesting of Fruit

In a large operation like Ben Epp's Strawberry Ranch, it is very difficult to harvest fruit under controlled conditions.

1. We did not keep data on the Thiessen Saskatoons as there were random pickers in prior to the fruit being ready to pick and they did pick fruit here, there and every where. The yields on these plants would be generally in the 8# per plant range.

2. The Smoky plants which were quite slow and late in development did not produce any edible fruit as a result of leaf spot and dry conditions.

3. The Northline plants were picked with accurate data and no public problems (**Table 1**).

Disease

All years at Ben Epp's showed a large amount of two diseases.

1. Leaf Spot

Leaf spot was severe in both years of harvesting. In 1996 all of the Smoky and Northline were considered unmarketable, however the yields are accurate to the treatments.

In 1997 the only recordable yields were on Northline which although you could actually have eaten the fruit it was severely damaged by leaf spot. This is the first year in which a significant difference in yield occurred in the spring pruned plants.

All cultivars showed severe leaf spot. Thiessen would have had the best quality of fruit ripening before the leaf spot took over. However, it was largely picked by customers before it was quite mature.

2. Canker

Canker was present in all cultivars in noticeable amounts. It did, however, show no increase in the spring, summer or fall pruning periods over the controls. My ratings would be that there was quite enough canker present in the plantation to have been a factor should the pruning have been an encouragement. The hedge cut pruning on the other hand did show a large increase in canker particularly in the 3 foot hedge cut with less in the 4 foot cut and little or no increase in the 5 and 6 foot cuts in all cultivars. This was somewhat expected as the same susceptibility showed up in the 1995 Pruning report on Thiessen seedlings. In that report larger wood, cut and left open showed severe amounts of canker and almost no canker at the 6 foot level.

Note: Fall Flooding

Fall flooding occurred in the fall of 1996 and in May of 1997 we noted that particularly the Smoky plants looked very poor (0% to 60% dead). After talking to the owner he felt that flooding when giving the plants a fall watering was the cause of the problem. We reported on this condition in the 1998 report and have since noticed that all of the plants where die back occurred from flooding showed a high degree of canker developing. This sever canker was quite evident in the spring of 1998.

Plant Height and Pruning Shape at Ben Epp's Ranch

All plants in the pruning trial where tipping back occurred were quite comfortably maintained at the 6 to 7 foot (2 m) range. The spring, summer and fall treatments look good for a pickable height. Plant shape was good after the first main stem (oldest) was removed. Sometimes this wood may be in excess of 20%, but you must remove it at the start as it is the oldest. It should be **noted** that removing this first growth is valuable in that it 1) opens up the shrub to better light

and 2) makes the plants somewhat V-shaped in the row which may be desirable for some machine harvesting equipment.

It also should be **noted** that some cultivars do not regenerate growth as rapidly as others and therefore may have to be pruned out only 10-15% per year to keep your stand density. Thiessen, for example, has much less regrowth than Smoky or Northline and must be handled differently by a grower.

Points of importance from the Ben Epp Ranch Data

1. There is some positive significant difference in yield due to spring pruning in Northline.
2. Leaf spot which was not sprayed for control was extreme in all cultivars and was present each year.
3. Canker which was quite present only became a problem when hedge cutting to three (3) feet in height, and where plants were injured by flooding.
4. At no time was pruning of any significance in yield reduction.
5. The first removal in pruning gives you a more open plant with better fruiting and harvestable character.

1998 Change of Site

We moved from Ben Epp's Ranch where Ben has a problem in restricting pickers to Cliff Shockey's plantation. Ben felt there was a conflict in restricting people and that research detracted from his operation.

Cliff Shockey's Plantation

Observations

Mr. Shockey's operation contained Martin, a seedling of Thiessen and Smoky, one of the earliest Saskatoon berry selections. His plants looked good and were being grown in a silty clay valley soil. Irrigation when necessary was by trickly irrigation.

Height

The Martin Saskatoons were reaching a height of eight feet in the spring of 1998 and were already uncomfortable for picking. After the pruning in the spring, summer and fall the test rows were in the six foot range.

The Smoky Saskatoons were reaching the six foot plus mark and were pruned to the six foot height. In the spring when the first spring pruning occurred we narrowed the rows to approximately 1 foot (.3 m) in the Smoky and Martin Saskatoons to be included in the pruning trial. Although little is needed to be narrowed in the Martins the Smokys were very thick and sucker growth was abundant. This operation was carried out using a cutting disc.

Both cultivars were pruned to remove approximately 20% of the plant and tipped back. The pruning of Martin was identical to the pruning at Ben Epp's in that we had a control, spring, summer and fall periods of pruning. It was slightly different however, in that we used four replicates and instead of examining on a per plant basis used a 3 m measured row of treatment. The plants at the Shockey plantation were continuous in the row and would have been impossible to pick fruit and prune on a per plant basis. The Smoky plants showed a fair amount of variability and we were only able to choose 8 replicates of the same quality to work with. We chose to run a control and a spring pruning treatment as the spring pruning treatments in the past looked promising.

Data

1998 – In the first year of pruning and harvest at the Shockey plantation we were again confronted by a problem. The pruning activities were right on schedule however the harvesting of fruit was unnecessary because of a severe infestation of insects including bud moth larva and canker worms which left. the plantation near 100% fruitless. There was no data collectable. The plants however, recovered with new leaves and looked good in the summer/fall. Mr. Shockey was reluctant to spray his plants at the time of the infestation.

1999 – In the spring of 1999 Mr. Shockey was ready to spray for insects and did so, allowing the plants to produce a good yield of fruit. Previous to the fruiting we performed the spring pruning before the plants leafed out and again removed excess sucker growth from the rows. After harvest we completed the summer pruning replicates and fall pruning at leaf drop. We removed clippings at each pruning time, placed them in the owners trim piles where they were burned.

Harvesting of Fruit

At the Shockey plantation we had little trouble harvesting our fruit as the owner hired people to pick fruit and as a result stray picking was not a problem.

The 1999 production looked promising as the fruit developed with little insect or leaf spot present. At the start of ripening with warm damp weather, we noticed considerable leaf spot developing and quickly got our harvesting done with the help of an additional worker.

To harvest quickly we reduced our row distance to 3 feet per replicate by taping a ribbon over the harvest area and picking accurately within the ribbons. The fruit was picked and frozen each day for further weighing and grading. At the end of the picking period we graded unmarketables out and recorded marketable and non marketable weights.

Yield Results

Our harvest yielded us very accurate results however, none of the treatments show any significant differences in marketable or total yields. These results hold true for both the Smoky (**Table 2**) and the Martin (**Table 3**).

Disease

Leaf Spot

Leaf spot quickly attacked both cultivars with no preference for any treatments or controls. All plants were affected and within three weeks were almost bare of leaves.

Canker

At the Shockey plantation there was a very low incidence of canker but it was evident. None of the treatments showed any visible difference from the controls.

Plant height and pruning shape

Both cultivars and all the treatments showed plants that stayed within the 6 to 7 foot (3 m) picking range. Smoky again showed plants with an abundance of suckers and Martin like its parent Thiessen showed little suckering.

2000

In 2000 we harvested the trials at Shockey's in a similar manner to the 1999 trials. Yields were down considerably which is sometimes the case in fruit production where the previous year was a high producing year. In 2000 we examined the number of clusters of fruit as well as fruit berry weight to see if there was any amount of differences. In the 3 foot sample we counted the number of clusters, took an average number of fruit per 20 clusters and an average weight per 100 hundred fruit. This data as well as the total 2000 yield is recorded in **Table 2** - Smoky and **Table 3** – Martin.

At the time of harvesting there was some leaf spot developing equally throughout the trials. It appeared to be most evident in the sheltered areas.

Yield Results

Martin – There was no significant difference in any of the treatments or control in the Martin cultivar.

Smoky – The Smoky cultivar did respond differently in that the Pruning treatment (spring) did show a significant response in total yield and number of clusters carried.

Disease

Leaf Spot was still evident in 2000, however, not as severe as in other years. This was probably due to drier weather about harvest time.

Canker was hardly noticeable throughout the field and there was no evidence of its presence being related to any treatments.

Plant Height and Shape

Plant height was quite controllable with removal, pruning and tipping back on both Smoky and Martin Saskatoon berry plants. Martin like Thiessen is not as prolific in sending out suckers as is Smoky and for that reason should be removal cut at a lower rate than Smoky.

Points of importance from the Shockey Plantation Data

1. Spring pruning in Smoky showed a significant increase in cluster numbers and a resulting increase in yield over the control plants.

2. None of the pruning treatments in Martin showed any significant reduction in yield or for that matter increase in yield over the control. **This is important** because what most farmers are concerned about pruning is that there may be loss of yield due to loss of fruiting area on the plants.

3. There was no difference in severity of leaf spot related to pruning procedure.

4. Canker did not show up as a result of pruning.

5. Plant character and height were improved with all of the spring, summer and fall pruning periods.

Discussion of Results

Production of Saskatoon berry at the Ben Epp ranch and at Cliff Shockey's plantation were unpredictable at best. It was impossible to be sure of a crop even when it was a few days away from being ripe. Therefore it is very hard to relate yield results to the particular pruning procedure.

Yield Results at Ben Epp's

Factors affecting yield results at Ben Epp's ranch were 1) straying pickers and 2) severe leaf spot. Both conditions were not in my control.

Yield results where leaf spot and stray pickers were not a factor are shown in **Table 1**. **Result #1** The 1997 harvest shows that there was no significant loss in yield where plants had 20% of their wood removed and tipped back to approximately 6 feet (2 m). This is important to growers as most of them put off pruning because they fear it will greatly reduce their yields. **Result #2** In the 1997 results Northline (spring pruning) shows a significant increase in yield over the control, summer, and fall pruning treatments. This is important because it indicates that the early spring pruning in 1996 not only did not reduce the yield in 1996 but actually significantly increased the yield the following year in 1997. I do not know in what respect the yield was increased (i.e. numbers of clusters, number of fruit, weight of fruit) however the higher yield was significant. It is

quite possible that the following year should I have been able to stay at the strawberry ranch I may have shown similar yield results for the summer and fall pruning times.

Yield Results at Cliff Shockey's

At the Shockey plantation results were taken out of my control by insect destruction in 1998 and hampered by the affects of leaf spot in 1999 and 2000. **Results #3** In **Table 2** 1999 Smoky with the spring pruning showed higher but not significantly higher yields than the control. It is again important that although the yields are similar the pruning treatment has not reduced the yields and the grower will find picking much easier. **Result #4** In **Table 2** 2000 Smoky results show that the spring pruning plants were significantly higher in numbers of berry clusters and higher in yields of fruit. Again it is important to the grower that the overall yields although lower than in 1999 were significantly higher than the controls. From these results it indicates to me that a grower can safely carry out a spring pruning procedure without reducing his yields. **Results #5 Table 3** In 1999and 2000 you can see that there was no significant yield results from any pruning procedure over the control plants in Martin Saskatoons. This does not mean that a grower should not prune his Martin Saskatoons. On the contrary, all of the treatments are equal or above the yields of the control plants and all are much easier to harvest with the reduced height. **Result #6** Out of the Martin results in **Table 3** you can see that in 1999 the spring pruning procedure had the highest yield over all other treatments or control, and in 2000 the spring pruning showed the lowest yield. Conversely in 1999 the summer pruning treatment showed the lowest yield and in 2000 was the highest over all other treatments and control. What this tells us is that Saskatoons like apples and other fruits show alternating yields sometimes referred to as alternate bearing which in these cases might be due to the pruning treatments.

Leaf Spot Observations

I could not see any difference in the time or severity of leaf spot infections in relation to any of the pruning treatments. Although there appears to be differences between cultivar severity of infection, often the difference is in the time of fruit ripening. If a cultivar can produce, ripen and be picked prior to the onset of the disease it will have partly or completely escaped the fruit yield loss. The leaf damage and loss however, when examined in the fall is often similar from one cultivar to another.

Canker Observations

Canker is not a great problem when pruning of older wood provided it is a removal cut to the ground. If cuts are made above ground level through wood of a diameter greater than ½ inch (1.25 cm) then some canker infection may occur. The wood diameter is probably not as important as is the age of the wood, as older harder material does not repair itself as easily or quickly as new growth. Canker did appear on mechanically damaged material and if this is larger material it should be re-cut to a smooth surface as soon as possible and covered with a wound dressing as is commonly recommended for most large cut pruning. Canker was also noted where plants had been injured by flooding. These plants would be best cut to the ground, burn the tops and allow new replacement growth to emerge. It is possible these plants were so badly hurt by flooding that they would not recover.

All small diameter above ground cuts did not show any amount of canker. It appears that under normal canker levels it is safe to control height by tipping plants back to control the height. Should there come a time when canker is severe you may be advised to cover tip cut wounds with a wound dressing.

Pruning Time of Year Observation

Height/Shape

The time of the year when pruning was carried out did not influence the height and shape of the plant. Although there was an influence at the time of pruning this difference over the year was evened out, all three times of the year pruning procedures appeared similar.

Leaf Spot

There did not appear to be any amount of difference in the time pruning was carried out on the amount of leaf spots. Looking at the field generally however, you could see that very sheltered areas and a thicker plant stand did allow the disease to progress more quickly than thinner growth and areas which allowed for better air movement.

Canker

There were no differences in the amount of canker in relation to time of the pruning procedure.

Conclusions

- Yields -

1) Yields were not significantly reduced by any pruning procedure.
2) Yields harvested under the spring pruning procedure were significantly higher. **Table 1** in Northline the second year of pruning over the control plants and other treatments. Also **Table 2** Smokey yields were higher under the same time treatment.

From these yields and those of Table 3, I conclude a grower can feel confident that he should not suffer a significant yield reduction in their Saskatoon berry production as a result of normal spring, summer or fall pruning procedures where a small percentage of wood is removed (20% or less) and plants are tipped back to 6-7 feet (2 m).

- Bush Height and Shape -

3) All cultivars examined can be kept to an acceptable picking height by renewal pruning and tipping back. All cultivars can be kept narrow enough in the row by removing the excess sucker spread by hand or using a cutting disc. The Martin and

Thiessen cultivars may need as little as 10% removal cuts each year whereas higher sucker producers like Smoky or Northline may be best pruned with 20% in some years.

- Disease –

4) Leaf spot cannot be influenced by any of the pruning procedures we looked at and growers should be well advised to use some form of disease control prior to the onslaught of the disease. The disease appears to develop very quickly under warm, wet and humid conditions. It is important to spray a recommended product in a timely fashion.

5) Canker is not a problem under the removal pruning and the tipping back procedure we use at any of the three times of the year we pruned. I would, however, conclude that you should <u>not</u> at any time of year leave large open cuts as canker is likely to invade the wounds and eventually kill that wood to the ground.

<u>Advice to Producers</u>

1. Choose lower growing cultivars of Saskatoon berry for ease of pruning and maintaining a suitable height for hand or machine harvesting.

2. Should the taller named cultivars be your choice because of quality of fruit or some other characteristic, start pruning your plants at a young age to avoid getting them too tall before you start to prune. Plants that are tall promote tall regrowth because competition for light can become a factor. Also plants that have gotten tall or large will have a more extensive root system and will be harder to prune down to a lower height.

3. Pruning on a removal basis and tipping back can be done in spring, summer or fall. However, I feel that spring may be your best choice because (a) it is easier to prune without leaves, (b) it allows the cuts to heal as soon as the plants start to grow in the spring and (c) labor should be available in early spring. Also spring pruning is the only time of the season that has shown a significant increase in production over the controls and the other treatments.

4. Growers should not be afraid to get the pruning under way. Do not put pruning off year after year as <u>at no</u> time did any of the three seasons of pruning reduce the yield significantly.

<u>Future pruning work on Saskatoon berry</u>

It is my belief that all pruning to be of real benefit must be on a long term study basis. For this reason, I would like to see the work be done on a permanent site that is under institutional control. For the most part, I have found growers to be very helpful and accommodating, however, there are a number of conflicts that always seem to come into play. These conflicts include the 'U' picking public and spraying desires of the owners to control both disease and insects.

DATA AND ANALYSIS

Table 1. Harvest data (1996 – 1997) for saskatoon cultivars Northline and Smokey

Timing of Pruning	Smokey 1996 Yield (kg)[x]	Northline 1996 Yield (kg)[x]	1997 Yield (kg)[x]
Control (no pruning)	1.61	1.74	0.17 b
Spring	1.23	1.73	0.60 a
Summer	n/a	n/a	0.18 b
Fall	n/a	n/a	0.16 b
Statistical Analysis[†]			
Significant Difference[‡]	ns	Ns	**

x - n/a = not applicable
† - means within a column followed by a different letter are significantly different by the indicated significant difference
‡ - ns = not significant; ** = significant at $p \leq 0.01$

Table 2. Harvest data (1999 – 2000) for saskatoon cultivar Smokey

Timing of Pruning	1999 Marketable Yield (kg)	1999 Total Yield (kg)	2000 No. of Clusters	2000 Fruit/Cluster	2000 100 Fruit Weight (g)	2000 Total Yield (kg)
Control (no pruning)	1.55	1.68	17.0 b	6.15	78.8	0.082 b
Spring	1.83	1.93	76.0 a	6.60	76.1	0.392 a
Statistical Analysis[†]						
Significant Difference[‡]	ns	ns	**	ns	ns	*

† - means within a column followed by a different letter are significantly different by the indicated significant difference
‡ - ns = not significant; * and ** = significant at $p \leq 0.05$ and $p \leq 0.01$

Table 3. Harvest data (1999 – 2000) for saskatoon cultivar Martin

Timing of Pruning	1999 Marketable Yield (kg)	1999 Total Yield (kg)	2000 No. of Clusters	2000 Fruit/Cluster	2000 100 Fruit Weight (g)	2000 Total Yield (kg)
Control (no pruning)	2.93	3.14	115.0	8.08	131.9	1.241
Spring	3.33	3.61	111.8	8.85	122.8	1.226
Summer	2.66	2.96	136.8	8.38	126.5	1.424
Fall	3.24	3.50	126.3	7.18	136.1	1.246
Statistical Analysis[†]						
Significant Difference[‡]	ns	ns	ns	ns	ns	ns

† - means within a column followed by a different letter are significantly different by the indicated significant difference
‡ - ns = not significant; * and ** = significant at $p \leq 0.05$ and $p \leq 0.01$

Project Related Extension Activities

1996 April	-	University Extension Dept. – Pruning talk/demonstration
1996 July	-	Scott, Saskatchewan Field Day talk/pruning demonstration
1996 October	-	Saskatchewan Horticulture Association Workshop/annual meetings
1997 April	-	University Extension Dept. – Pruning Demonstration
1997 April	-	Albert Fruit Growers talk on fruit production
1997 July	-	Scott, Saskatchewan Field Day – Horticulture tour
1998 February	-	Humboldt, Saskatchewan – Agriculture Extension – talk
1998 March	-	Alberta Fruit Growers – small fruit production
1998 April	-	Extension Dept. Pruning Demonstration
1998 July	-	Scott, Saskatchewan Field Day tour and questions
1998 July	-	Alberta Field Day on Pruning Saskatoon Berry
1998 August	-	Summer tour of Horticulture plots
1998 November		Watrous, Saskatchewan S.H.A. talk on fruit
1990 February	-	Bruno, Saskatchewan Sask. Agr. Extension – Fruit Production
2001 March	-	North Battleford, Sask. – Agric. Extension – Pruning Selection and Problems
2001 Spring	-	Saskatchewan Fruit Growers newsletter, Report on projects
2001 November		Saskatchewan Fruit Growers report on Pruning Projects

Other Informational Transfer

University Class – Hort 441 Fruit Production 1995, 1997, 1999
- Diploma Agriculture Fruit and Vegetable Production 2000

D. Personnel

1996	Trevor Christopher, Student	28 days
	John Peters, Technician	6 days
	Tom Ward	6 days
1997	Valerie Catinot, Student	34 days
	John Peters, Technician	2 days
	Tom Ward	6 days
1998	Milan Milanovich,Student	18 days
	Corey Walcer, Student	2 days
	Tom Ward	18 days
1999	Gail Weatherspoon, Student	~20 days
	Jonathan Warnock, Student	20 days
	Michel Doherty	~4 days
	Tom Ward	5 days

2000	Gail Weatherspoon, Student	8 days
	Corey Walcer, Student	12 days
	Moira Moser, Student	17 days
	Tom Ward	10 days

E. **Equipment** – None purchased.

F. **Project Developed Materials** - No materials developed.

G. **Project Photos** - Slides can be made available, if desired.

H. **Acknowledgement** - It was always mentioned at talks or demonstrations that this was a Saskatchewan A.D.F. project.

I. **Expense Statement** – Previously sent.